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| **IB Criterion Aspects** | | |
| Design | **1. Defining the Problem and Selecting Variables** | **2. Controlling Variables** | 3. Developing a Method for Collecting Data | ***ECA std 9:***  ***7***  ***6 6.5***  ***5 5.5***  ***4 4.5***  ***3 3.5***  ***2 2.5***  ***1 1.5***  **0 0.5**  **x1 x2 x3 x4** |
| ***IB Total =***  ***6***  ***5***  ***4***  ***3***  ***2***  ***1***  ***0*** | C P N n/a • Independent Variable  C P N n/a • Dependent Variable  C P N n/a • Research Question (using variables)  C P N n/a • Literature Values (or statement of none)  C P N n/a • Cite (MLA) sources for Lit Values  C P N n/a • Hypothesis based on Literature Values  C P N n/a • Brief explanation of the experiment | C P N n/a • **Table 1** Control Variables (include all below)  C P N n/a • Justify the need to control / effect on results  C P N n/a • Specifically describe how each is controlled  C P N n/a • Measurement of the control   * What instrumentation is needed * Frequency of measurements   C P N n/a • Explain which variables that can’t be controlled  C P N n/a • State if Quantitative vs Qualitative Control   * Is measurement or observation needed | C P N n/a • Procedure is detailed, easy to repeat  C P N n/a • Cite (MLA) sources if used for procedure  C P N n/a • Materials list is complete  C P N n/a • Units, precision, size, formula of materials  C P N n/a • Sufficient range of independent variable  C P N n/a • Appropriate # of trials selected  C P N n/a • Picture (or drawing) of apparatus  C P N n/a • Collection of Data (explanation or table) |
| ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** |
| **DCP** | 1. Recording Raw Data | **2. Processing Raw Data** | **3. Presenting Processed Data** | ***ECA std 10:***  ***7***  ***6 6.5***  ***5 5.5***  ***4 4.5***  ***3 3.5***  ***2 2.5***  ***1 1.5***  **0 0.5**  **x1 x2 x3 x4** |
| ***IB Total =***  ***6***  ***5***  ***4***  ***3***  ***2***  ***1***  ***0*** | C P N n/a • **Table 2** containing given/relevant values/formulas  C P N n/a • **Table 3** containing raw quantitative data  C P N n/a • **Table 4** containing qualitative observations  C P N n/a • All data is collected individually  C P N n/a • Tables contain title, headings, explanations  C P N n/a • Units are present and correct throughout  C P N n/a • Significant figures are correct within 1 value  C P N n/a • Every value contains uncertainty (% or ±)  C P N n/a • Tables are organized and easy to follow | C P N n/a • **Table 5** containing processed data  C P N n/a • Averages are taken of PROCESSED data  C P N n/a • **Table 6** containing final results, compare to lit.  C P N n/a • **Table 7** containing calculations   * Equation * Example * Explanation   C P N n/a • Units, Sig Figs, Uncertainty throughout  C P N n/a • Calculations are correct | **For Graphing**: (if at all possible, graph indep/dep variables)  C P N n/a • Graph created is original, with raw data (Excel)  C P N n/a • Correct choice of graph type (scatter, line, bar)  C P N n/a • Correct data was used to make graph  C P N n/a • Title, axis, key, units, correct  C P N n/a • Error bars included (for any graph)  C P N n/a • Min/Max gradient line drawn  C P N n/a • Trend line (with equation) and R2 included  C P N n/a • Presentation of Graph: legible, neat, etc  C P N n/a • Explanation of graph and results of graph  **For non-graphing labs**: (do your best to create a graph)  C P N n/a • An explanation of why graph is not needed  C P N n/a • Describe an extension to the lab that would provide a trend that would be worth graphing and specifics about the title, axis, units, variables, for the graph. |
| ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** |
| **Conc. & Eval.** | 1. Concluding | **2. Evaluating Procedure(s)** | **3. Improving the Investigation** | ***ECA std 11:***  ***7***  ***6 6.5***  ***5 5.5***  ***4 4.5***  ***3 3.5***  ***2 2.5***  ***1 1.5***  **0 0.5**  **x1 x2 x3 x4** |
| *IB Total =* ***6***  ***5***  ***4***  ***3***  ***2***  ***1***  ***0*** | C P N n/a • Results are repeated at beginning  * Major Results * % Error * Uncertainty * Units * Refer back to graph (repetitive, yes)   C P N n/a • Restate and respond to the research question  C P N n/a • Literature values are referenced (cited using MLA)  C P N n/a • Describe the **chemistry** behind the experiment   * Relevant IB Curriculum Material * Support your results, or why they can’t be trusted   C P N n/a • Conclusion is based on your results  C P N n/a • Uncertainty compared to percent error | C P N n/a • Explain difference between expected/observed  C P N n/a • Comment on the reliability of procedure  C P N n/a • Can the results be trusted (outliers?)  C P N n/a • **Table 8a** – list errors/problems/limitations   * Instrumental errors / uncertainties * Human errors (spills, contamination, etc) * Anything that effects the results   C P N n/a • **Table 8b** – state impact of each error on results | C P N n/a • **Table 8c** – Improvement to minimize errors   * New Equipment (name, precision, location) * Manipulation of procedures (and why) * Suggestions to improve human errors   C P N n/a • Provide at least one relevant extension for the lab. This can be simply studying a different variable, testing the effect of an error source, real world examples, vocational (job) applications, possible extended essay topics, etc. |
| ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** | ***C = 2 P = 1 N = 0*** |

**Name**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_ **Lab:**\_\_\_\_\_\_\_\_ **Date:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Updated 3.21.11